

INTEGRAL THREE-DIMENSIONAL IMAGING WITH DIGITAL
RECONSTRUCTION

ABSTRACT OF THE INVENTION

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A computer-based three-dimensional image reconstruction method and system are presented. An elemental image array of a three-dimensional object is formed by a micro-lens array, and recorded by a CCD camera. Three-dimensional images are reconstructed by extracting pixels periodically from the elemental image array using a computer. Images viewed from an arbitrary angle can be retrieved by shifting which pixels are to be extracted. Image processing methods can be used to enhance the reconstructed image. Further, the digitally reconstructed images can be sent via a network. A system for imaging a three-dimensional object includes a micro-lens array that generates an elemental image array. The elemental image array is detected by a

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CCD camera to generate digitized image information. A computer processes the digitized image information to reconstruct an image of the three-dimensional object. A two-dimensional display device may be connected directly or indirectly to the computer to display the image of the three-dimensional object. The computer may also be used to generate virtual image information of a virtual three-dimensional object. This can

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then be combined with the digitized image information to provide combined image information. The two-dimensional display device may be used to display a virtual image or a combined image.

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